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| --- | --- | --- | --- | --- | --- |
| Horomone | Location | Regulation of release | Target Organ/Effects | Disease | Solubility |
| Oxytocin | Secreted by Hypothalamus, stored in Posterior Pituitary | Neural – impulses from hypothalamic neurons in response to cervix stretching or suckling at breastInhibited – lack of appropriate stimuli | Uterus – stimulates uterine contractions and laborBreast – initiates milk production  |  | Water-soluble |
| ADH | Secreted by hypothalamus, stored in posterior pituitary | Neural – impulses from hypothalamic neurons in response to increased blood solute concentration or decreased blood volume; stimulated by pain, drugs, low blood pressureInhibited – adequate hydration and alcohol | Kidneys – kidney tubules to reabsorb water from forming urine back into the blood  | Low ADH – diabetes insipidusHigh ADH – syndrome of inappropriate ADH secretion (SIADH) | Water-soluble |
| Growth Hormone | Anterior Pituitary  | Hormonal – by GHRH by low levels of GH in blood or secondary triggers like deep sleepInhibition – negative feedback by GH and IGFs | Liver, muscle, bone, cartilage | Low GH – pituitary dwarfismHigh GH – gigantism in children and acromegaly in adults  | Water-soluble |
| Thyroid-Stimulating Hormone (TSH) | Anterior Pituitary | Hormonal – by TRHInhibition – negative feedback exerted by thyroid hormones  | Thyroid gland |  | Water-soluble |
| Adrenocorticotropic hormone (ACTH) | Anterior Pituitary  | Hormonal – CRH by fever, hypoglycemia, stressInhibition – negative feedback inhibition exerted by glucocorticoids | Adrenal cortex – promotes release of glucocorticoids and androgens | High ACTH: Cushing’s disease | Water-soluble |
| Follicle-stimulating Hormone | Anterior pituitary gland | Hormonal – by GnRHInhibition = negative feedback inhibition by inhibitin, estrogen in females and testosterone in males | Ovaries and testes; in females stimulates ovarian follicle maturation and production of estrogens; in males stimulates sperm production | Low FSH: failure of sexual maturation | Water-soluble |
| Luteinizing Hormone | Anterior pituitary  | Hormonal – by GnRHInhibition – negative feedback inhibition by estrogens and progesterone in females and testosterone in males | Ovaries and testes; in females triggers ovulation and stimulates ovarian production of estrogens and progesterone; in males promotes testosterone production | Low LH: failure of sexual maturation | Water-soluble |
| Prolactin (PRL) | Anterior pituitary | Hormonal – by decreased PIH, release enhanced by estrogens, birth control pills, breast feeding and dopamine blocking drugsInhibited – by PIH | Breast secretory tissue: promotes lactation | Low PRL: poor milk production in nursing womenHigh PRL – inappropriate milk production, cessation of menses in females; impotence in males | Water-soluble |
| Thyroid Hormone (TH) | Thyroid gland | Hormonal – hypothalamus secretes TRH to stimulate TSH | Body’s major metabolic hormone; affects almost every cell in the body; binds to intracellular receptors within nucleus and activates transcription of mRNA for protein synthesis | Low TH – fatigue, feeling cold, delayed puberty/growth, enlarged thyroid, weight gainHigh TH – sweating, hunger, fatigue, restlessness, fast heart rate | Lipid-soluble |
| Calcitonin | Thyroid gland | Humoral – released by parafollicular cells in response to blood Ca2+ levels | Reduces blood Ca2+ levels |  | Water-soluble |
| Parathyroid hormone (PTH) | Parathyroid gland | Humoral – Parathyroid glands monitor blood Ca2+ levels and release PTH as needed | Stimulates osteoclasts to digest bony matrix and release calcium in the blood; enhances kidney reabsorption of Ca2+ from blood |  | Water-soluble |
| Aldosterone | Adrenal cortex | Humoral – released in response to low Na+ or high K+ | Primary target is the kidneys to stimulat Na+ reabsorption increased blood volume and pressure or K+ secretion decrease blood vol/pressure |  | Lipid-soluble |
| Glucocorticoids (cortisol) | Adrenal cortex | Hormonal – release promoted by ACTH | Acts on bone formation and cartilage; inhibit inflammation; depress immune system; disrupt cardiovascular, neural, gastrointestinal function; increase blood glucose levels |  | Lipid-soluble |
| Gonadocorticoids | Adrenal cortex |  | Act as sex hormones, axillary and pubic hair development |  | Lipid-soluble |
| Epinephrine/norepinephrine | Adrenal medulla | Neural – response to stress; sympathetic nervous system stimulates adrenal medulla to release | Fight or flight response; epi – stimulator of metabolic activities and dilator of small airways; nore – vasoconstriction and blood pressure |  | Lipid-soluble |
| Melatonin | Pineal glands | Regulated by hypothalumus and day/night cycles | Timing of maturation/puberty; body temperature, sleep, appetite; production of antioxidant and detoxification  |  | Water-soluble |
| Glucagon | Pancreas | Humoral – released in response to low glucose levels | Target is the liver and promotes breakdown of glycogen to glucose; synthesis of glucose to the blood by liver cells, causing blood glucose levels to rise; release of glucose to the blood by liver cells, causing levels to rise |  | Water-soluble |
| Insulin | pancreas | Humoral – released in response to high glucose levels | Lower blood glucose levels; enhance membrane transport of glucose, inhibit breakdown of glycogen to glucose, inhibit conversion of amino acids or fats to glucose |  | Water-soluble |

| **Table 1. Endocrine Glands and Their Major Hormones** |
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| **Endocrine gland** | **Associated hormones** | **Chemical class** | **Effect** |
| Pituitary (anterior) | Growth hormone (GH) | Protein | Promotes growth of body tissues |
| Pituitary (anterior) | Prolactin (PRL) | Peptide | Promotes milk production |
| Pituitary (anterior) | Thyroid-stimulating hormone (TSH) | Glycoprotein | Stimulates thyroid hormone release |
| Pituitary (anterior) | Adrenocorticotropic hormone (ACTH) | Peptide | Stimulates hormone release by adrenal cortex |
| Pituitary (anterior) | Follicle-stimulating hormone (FSH) | Glycoprotein | Stimulates gamete production |
| Pituitary (anterior) | Luteinizing hormone (LH) | Glycoprotein | Stimulates androgen production by gonads |
| Pituitary (posterior) | Antidiuretic hormone (ADH) | Peptide | Stimulates water reabsorption by kidneys |
| Pituitary (posterior) | Oxytocin | Peptide | Stimulates uterine contractions during childbirth |
| Thyroid | Thyroxine (T4), triiodothyronine (T3) | Amine | Stimulate basal metabolic rate |
| Thyroid | Calcitonin | Peptide | Reduces blood Ca2+ levels |
| Parathyroid | Parathyroid hormone (PTH) | Peptide | Increases blood Ca2+levels |
| Adrenal (cortex) | Aldosterone | Steroid | Increases blood Na+ levels |
| Adrenal (cortex) | Cortisol, corticosterone, cortisone | Steroid | Increase blood glucose levels |
| Adrenal (medulla) | Epinephrine, norepinephrine | Amine | Stimulate fight-or-flight response |
| Pineal | Melatonin | Amine | Regulates sleep cycles |
| Pancreas | Insulin | Protein | Reduces blood glucose levels |
| Pancreas | Glucagon | Protein | Increases blood glucose levels |
| Testes | Testosterone | Steroid | Stimulates development of male secondary sex characteristics and sperm production |
| Ovaries | Estrogens and progesterone | Steroid | Stimulate development of female secondary sex characteristics and prepare the body for childbirth |